Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S1 (R,S) Examination December 2025 (2024 Scheme)

Course Code: GZPHT121

Course Name: PHYSICS FOR PHYSICAL SCIENCE / LIFE SCIENCE

Max. Marks: 60 Duration: 2 hours 30 minutes

PART A

(Answer all questions. Each question carries 3 marks)

		CO	Marks
1	What are the characteristics of Laser?	1	(3)
2	Write any six advantages of fiber optic communication system over the conventional wire transmission system.	1	(3)
3	What are the conditions that should be satisfied to obtain sustained interference fringes?	2	(3)
4	Define resolving power and dispersive power of a grating.	2	(3)
5	Explain the probability interpretation of wavefunction. Write the normalization condition.	3	(3)
6	Explain the phenomenon of quantum mechanical tunneling with any two examples.	3	(3)
7	List two differences between longitudinal and transverse waves. Give an example for each.	4	(3)
8	What is SONAR?	4	(3)

PART B

(Answer any <u>one full question</u> from each module, each full question carries 9 marks)

Module -1

9	a)	Explain the construction and working of CO_2 laser.	1	7
	b)	Define Metastable state	1	2
10	a)	Define numerical aperture of an optical fibre. With a neat diagram derive an expression for numerical aperture of a step index fibre.	1	6
	b)	Calculate Numerical aperture of a fiber having core refractive index 1.52 and cladding refractive index 1.41.	1	3

Module -2

11	a)	Explain the experimental setup of air wedge with neat diagram, derive the expression for band width of interference pattern formed by air wedge.	2	6
	b)	Light of wavelength 6000 Å falls normally on a thin wedge-shaped film of refractive index 1.4 forming fringes that are 2 mm apart. Find the angle of the wedge in radians?	2	3
12	a)	Define Grating element and derive the expression for Grating equation with diagram.	2	6
	b)	A parallel beam of monochromatic light is allowed to incident normally on a grating having 4250 lines/cm and the second order maximum is formed at 30°. Calculate the wavelength of the light used.	2	3

Module -3

13	a)	Derive time dependent Schrodinger wave equation.	3	6
	b)	Find the de-Broglie wavelength of neutron of energy 15 MeV. Given mass of the neutron 1.675×10^{-27} kg and $h=6.625 \times 10^{-34}$ Js.	3	3
14	a)	State Heisenberg's uncertainty relations and explain absence of electron in the nucleus.	3	6
	b)	The life time of an excited state is 10^{-8} s. Determine uncertainty in the frequency of light emitted by an atom.	3	3

Module -4

15	a)	Derive the expression for fundamental frequency of transverse vibrations in a stretched string.	4	6
	b)	State three laws of transverse vibrations in a stretched string.	4	3
16	a)	Explain any three factors affecting acoustics of a building and give their remedies.	4	6
	b)	An auditorium has a volume of 10000 m^3 and is designed to have a reverberation time of 1.4 second. What should be the total absorption in the auditorium?	4	3

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